RECEIVED
CENTRAL FAX CENTER
NOV 0 8 2006

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Venkat Selvamanickam, et al.
Title:	APPARATUS FOR AND METHOD OF COOLING AND POSITIONING A TRANSLATING SUBSTRATE TAPE FOR USE WITH A CONTINUOUS VAPOR DEPOSITION PROCESS
App. No.:	10/609,236
Filed:	June 26, 2003
Examiner:	Ram N. Kackar
Group Art Unit:	1763
Customer No.:	34456
Confirmation No.:	7733
Atty. Dkt. No.:	1014-SP106

MS AMENDMENT
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. §1.132

Sir, I hereby declare and state:

1. I am a joint inventor of the subject matter presently claimed in the above-identified patent application.

2. I received my doctorate degree in Materials Engineering from the University of Houston in Houston, TX.

3. I have been employed by IGC/SuperPower, Inc. since 1994, wherein I have been mainly engaged in research and development of superconducting materials, superconducting conductors, and processes for forming same.

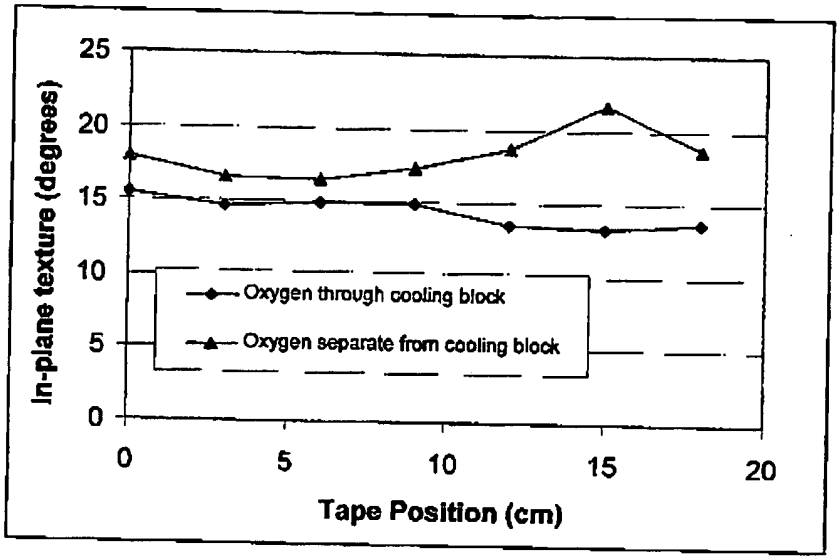
4. I have read the Official Action dated June 8, 2006, including the cited prior art. In particular, I have reviewed the cited prior art in detail, including Iijima et al. (US 2001/0006042), and Vaidya et al. (US 5,076,203).

5. Background

The claimed invention is drawn to an IBAD apparatus for cooling and positioning a translating substrate during continuous deposition. The apparatus calls for a deposition chamber through which the substrate is translated. Of particular consequence, a substrate block for positioning the substrate in the deposition zone is incorporated. The substrate block combines features of (i) internal liquid coolant channels and (ii) internal gaseous coolant delivery channels. The internal gaseous coolant delivery channels open to the deposition chamber through orifices at multiple points where the substrate block contacts the translating substrate. My co-inventor and I have empirically discovered that the particular combination of both internal liquid coolant channels and internal gaseous coolant delivery channels in the same substrate block is of particular consequence, and manifests in notably improved coating quality on the substrate in actual use. More particularly, I have discovered that the combination of both features notably improves the crystalline texture of the deposited material over conventional process methodology which relies upon supply of gaseous coolant separate from the substrate block. In this regard, the attention of the PTO is drawn to the below comparative testing I have carried out to memorialize the impact of the claimed invention.

6. Effect of integrated coolant delivery channels

A substrate was provided in a deposition chamber on a substrate block, and deposition material in the form of yttria-stablilized zirconia (YSZ) was deposited by ion-beam assisted deposition (IBAD). The substrate was 18 cm long, formed of polished Inconel-625. Two experiments were conducted, a first comparative experiment in which gaseous coolant (20 sccm oxygen) was flowed into the deposition chamber separate from the substrate block via a separate nozzle. In a second example, the same gaseous coolant was flowed through orifices in the substrate block. In this latter case, representing an embodiment of the claimed invention, the oxygen was injected along a back surface of the substrate overlying the substrate block. Fig. 1 below contrasts the in-plane texture of YSZ deposited in the two examples.



As Fig. 1 shows, the in-plane texture of the YSZ film formed with gaseous coolant delivery through the substrate block was found to have an in-plane texture significantly superior to that of the comparative example, in which oxygen was flowed into the deposition chamber through a separate nozzle. The average texture difference was about 3 degrees, quite significant. In addition, it is emphasized that in the context of a translating substrate, it is the peak or highest texture value that is of consequence, since that texture value determines the quality of the substrate. Here, the difference in peak texture values is about 6 degrees, representing even more significant improvement in texture according to use of a substrate block incorporating gaseous coolant delivery channels as claimed.

While it is not entirely understood why introduction of gaseous coolant through the substrate block significantly enhances crystallographic texture, one possible explanation is that the localized environment surrounding the substrate block and substrate has a higher partial pressure of gaseous coolant than the gaseous coolant partial pressure within the bulk of the chamber.

7. Despite the possible explanation of improvement in the crystallographic texture of the deposited material according to the claimed invention due to localized partial pressure, the improvement nevertheless comes as a surprise to me, and certainly would not have been expected by one of ordinary skill in the art. The results according to the claimed invention are not only unexpected, but also quite significant, particularly in the context of ion-beam assisted

deposition (IBAD), a particularly suitable technology for forming a buffer layer for an overlying high temperature superconductor layer.

8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and believe are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like, so made, are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

Date

Venkat Selvamanickam